Winter Severity Indices for 2003-2004

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Abstract

This report details the Winter Severity Index (WSI) monitoring for northern Wisconsin during the winter 2003-2004. Region-wide, This winter was moderate relative to variation in winter severity measurements since 1960. Average WSI was 61.6. Consequently weather impacts to the 2004 fawn cohort are expected to be minor.

Background (Wisconsin Department of Natural Resources 2001)

Prior to 1975, Wisconsin did not have a formal procedure for measuring winter severity and predicting its impact on deer herds. Michigan was using a severity index that used calorimeters to estimate a winter air-chill factor, and snow depth and sinking-depth measurements to estimate a snow-hazard factor (Verme 1968). The air-chill and snow-hazard factors were added together at the end of each week to derive a cumulative severity index. Ontario was using the Passmore-Hepburn Method, which also entails rather complex snow measurements (Passmore and Hepburn 1955).

Our winter severity index (WSI) was developed after testing several procedures for quantifying winter conditions (Kohn 1975). It used the number of days with a minimum temperature of 0ºF or below as a measure of winter air-chill, and the number of days with 18 or more inches of snow on the ground to estimate the snow hazard. These are added together from 1 December through 30 April to obtain the WSI. Days with both a minimum temperature of below 0ºF, and with 18 inches or more of snow on the ground add 2 points to the WSI. U.S. Department of Commerce (USDC) weather data were initially used to measure winter severity because they were easily obtained, and initially allowed us to compare WSI for previous winters with historical deer data (results of dead deer surveys, Summer Deer Observations, and buck harvests). The WSI was calculated for each USDC station and then averaged to obtain the Northern Forest WSI.

Beginning in the winter of 1986-87, weather data were collected at 35 DNR stations across the North (Fig. 1*).* Daily snow depths and minimum temperatures were recorded at these stations from 1 December through 30 April on a standardized form, and this information was sent to the Northern Wildlife Research Group at the end of each month. Survey instructions request that the presence of crusts be recorded. To date, information on crusts has not been incorporated into the index, but this information may affect our interpretation of the index.

WSI values for the Northern Forest from 1959-60 through 2003-04 are shown in fig. 2. Winters are considered “mild” if the calculated WSI is less than 50, “moderate” if it is between 50 and 80, “moderately severe” if it is between 80 and 100, and “very severe” if the WSI exceeds 100. The 30-year (1973-74 to 2003-04) average is 59. These designations are based on observed associations between WSI and winter mortality, fawn production, and buck harvest during the following year (Wisconsin Department of Natural Resources 2001).

Results

The winter of 2002-2003 was moderate relative to the 30-year average. The average across 31 stations with complete reporting was 61.6 (SE = 18.3). This included a nearly equal proportion of points generated by low temperatures and deep snows. Roughly 51% of the accumulated WSI points were "snow" points (Table 2) and most of these were accumulated during February and March snow events (Fig. 4). Low temperatures occurred relatively early with January being the coldest month (Table 2).

Among individual stations with complete records, 15 reported WSIs reflective of moderately severe conditions (50<WIS<80, Table 2) and 5 reported severe conditions (WSI>80).

Discussion

Region-wide the winter of 2003-2004 was not severe enough to cause concern for excessive winter mortality or depressed fawn production during the springs of 2004. While winter severity values were moderate and (in some instances) severe, severe winter weather was gone by April – when deer are most vulnerable to winter effects. Consequently we expect a relatively robust year-class for deer born during 2004. However, solid reproduction region-wide does not preclude local deer populations from experiencing winter weather effects where winter conditions are relatively severe (e.g. Upson area). A cluster of deer management units in northwestern Wisconsin reported a reduced proportion of yearling deer of both sexes in the 2003 harvest (Wisconsin Department of Natural Resources 2003). This cluster associates with a region where WSIs are characteristically higher (Bayfield, Ashland, and Iron counties) thus reduced yearling recruitment could reflect a winter weather effect. This issue warrants continued monitoring.

Acknowledgments

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Literature Cited

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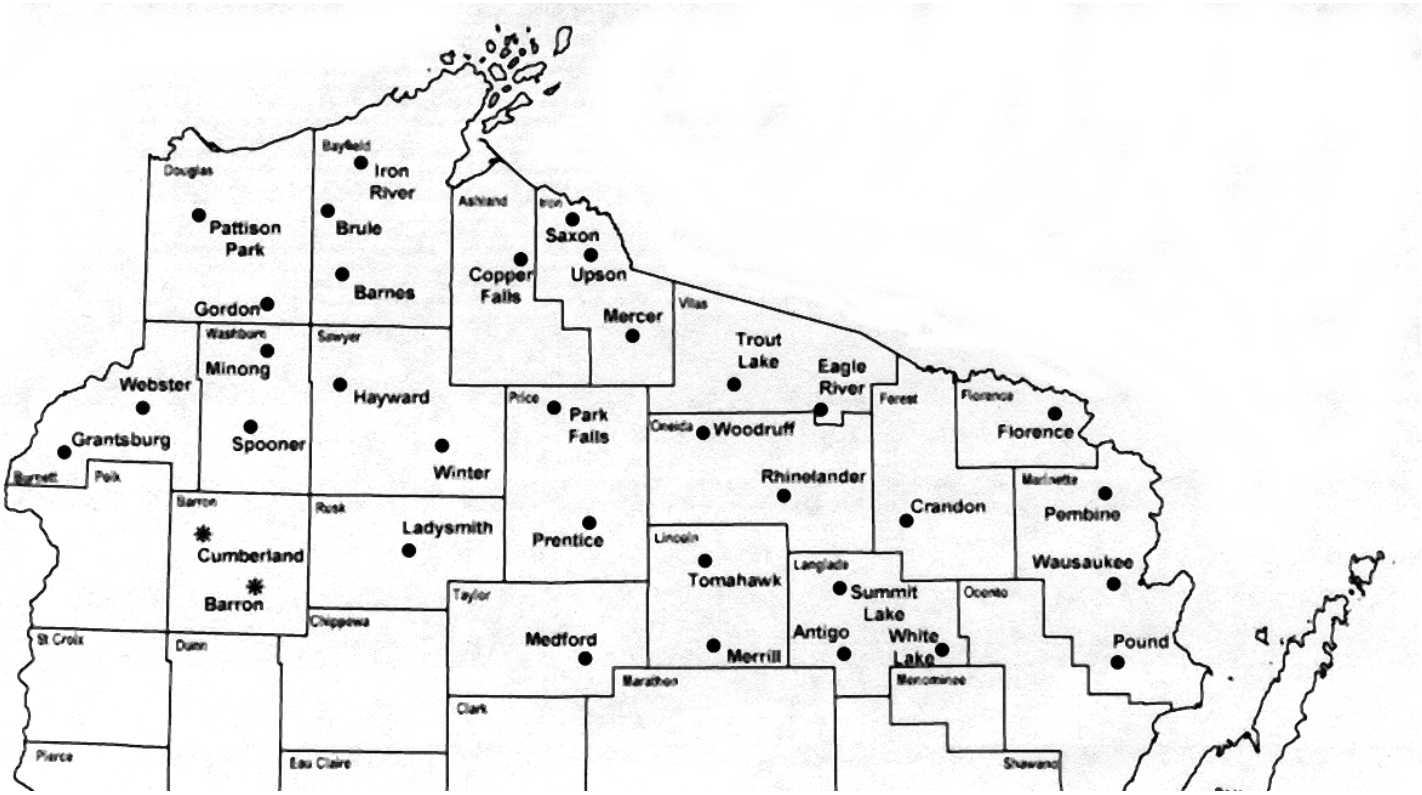

Figure 1. *Location of winter severity index recording stations, 1999-00 (* indicate supplemental stations).*

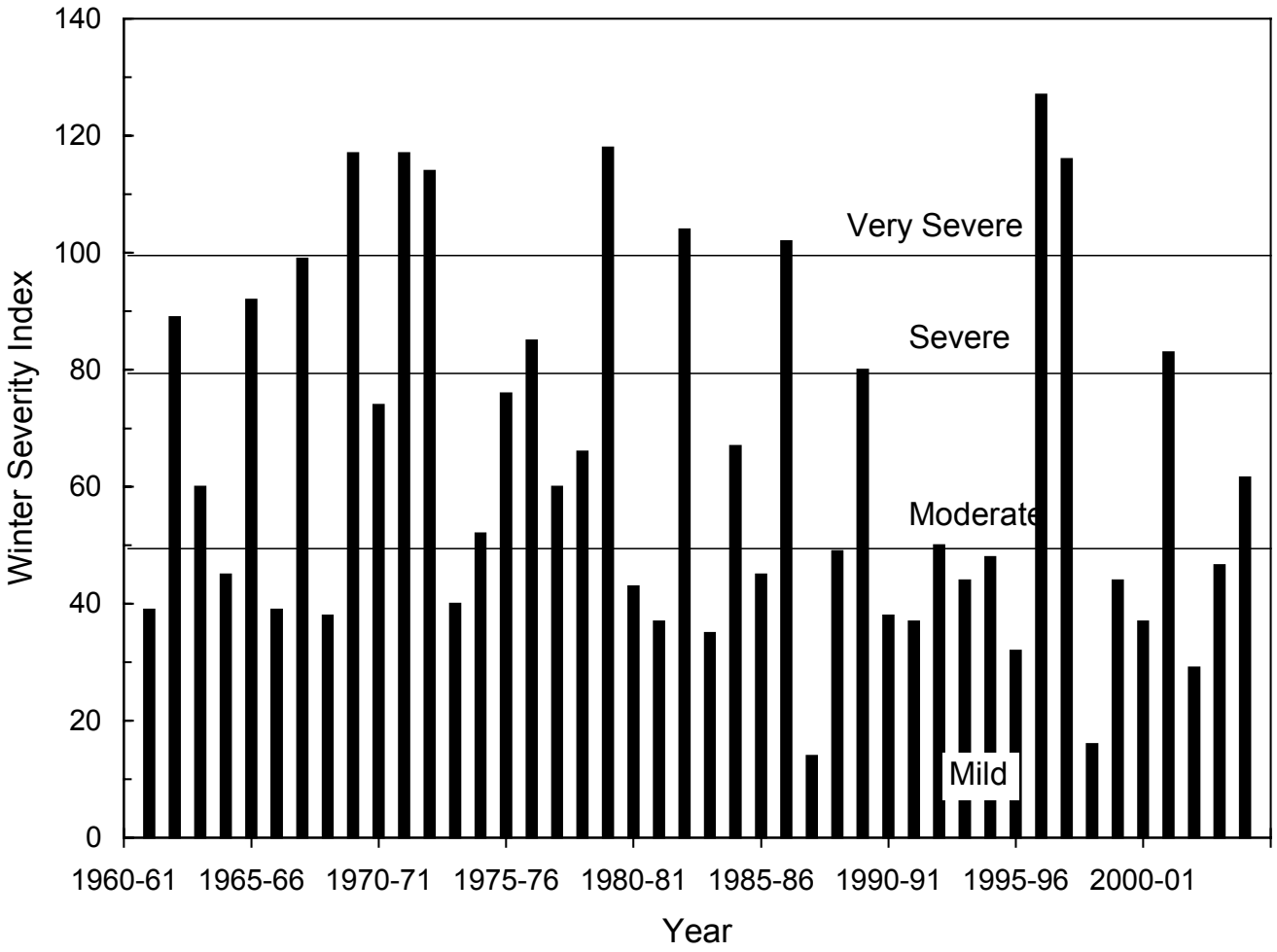

Figure 2. *Winter Severity Indices 1960-1961 to 2003-2004.*

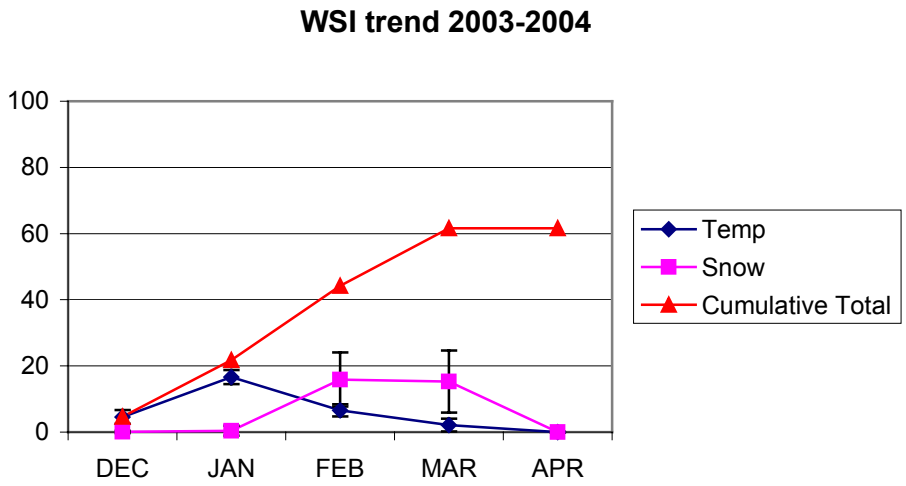

Figure 3. *WSI trend during 2003-2004. Error bars represent ± 1 standard error.*

Table 1. *WSI data reported for 2003-2004. TEMP = number of days with temperatures < 0° F, SNOW = number of days with snow depths > 18 inches.*

STATION	DECEMBER		JANUARY		FEBRUARY		MARCH		APRIL		TOTAL		
	TEMP	SNOW	TEMP	SNOW	TEMP	SNOW	TEMP	SNOW	TEMP	SNOW	TEMP	SNOW	TOTAL
Antigo	2	0	14	0	8	8	3	14	0	0	27	22	49
Barron	8	0	20	0	8	11	0	2	0	0	36	13	49
Barnes	5	0											
Brule	8	0	18	1	7	29	1	20	0	0	34	50	84
Copper Falls S.P.	5	0	17	0	6	8	0	7			28	15	43
Crandon	2	0	19	0	4	13	1	18	0	0	26	31	57
Eagle River	6	0	20	0	9	19	4	25	0	0	39	44	83
Gordon	8	0	19	0	8	7	1	0	0	0	36	7	43
Grantsburg	5	0	16	0	6	0	0	0	0	0	27	0	27
Hayward	6	0	18	0	6	17	2	20	0	0	32	37	69
Iron River													
Florence East	3	0	14	0	7	18	2	28	0	0	26	46	72
Ladysmith	4	0	16	0	4	21	8	6	0	0	32	27	59
Mercer	7	0	16	5	7	29	4	26	0	0	34	60	94
Merrill	5	0	18	0	7	10	1	21	0	0	31	31	62
Minong	7	0	19	0	6	28	3	20	0	0	35	48	83
New Wood	3	0	14	0	5	10	1	22	0	0	23	32	55
Park Falls	7	0	17	0	8	21	3	22	0	0	35	43	78
Pattison	5	0	18	0	7	3	0	1	0	0	30	4	34
Pembine	2	0	17	0	5	10	3	22	0	0	27	32	59
Prentice	5	0	17	0	7	10	1	19	0	0	30	29	59
Rhinelander	3	0	17	0	6	17	1	24	0	0	27	41	68
Saxon	3	0	14	0	6	12	0	4	0	0	23	16	39
Spooner	4	0	15	0	2	23	0	2	0	0	21	25	46
Summit Lake	2	0	14	0	9	16	6	18	0	0	31	34	65
Trout Lake	3	0	16	0	9	27	1	24	0	0	29	51	80
Tomahawk	4	0	22	0	7	21	5	17	0	0	38	38	76
Upson	7	2	15	7	4	29	1	25	0	0	27	63	90
Wausaukee	1	0	14	0	5	7	2	6	0	0	22	13	35
Webster	2	0	18	0	8	7	1	0	0	0	29	7	36
White Lake	2	0	14	0	9	16	3	18	0	0	28	34	62
Willow Lake													
Winter	6	0	16	0	4	23	4	16	0	0	30	39	69
Woodruff	6	0	15	0	10	23	3	27			34	50	84
Averages	4.56	0.06	16.68	0.42	6.58	15.90	2.10	15.29	0	0	29.90	31.68	61.58
SE	2.08	0.35	2.14	1.52	1.86	8.16	1.94	9.41	0	0	4.67	16.51	18.29